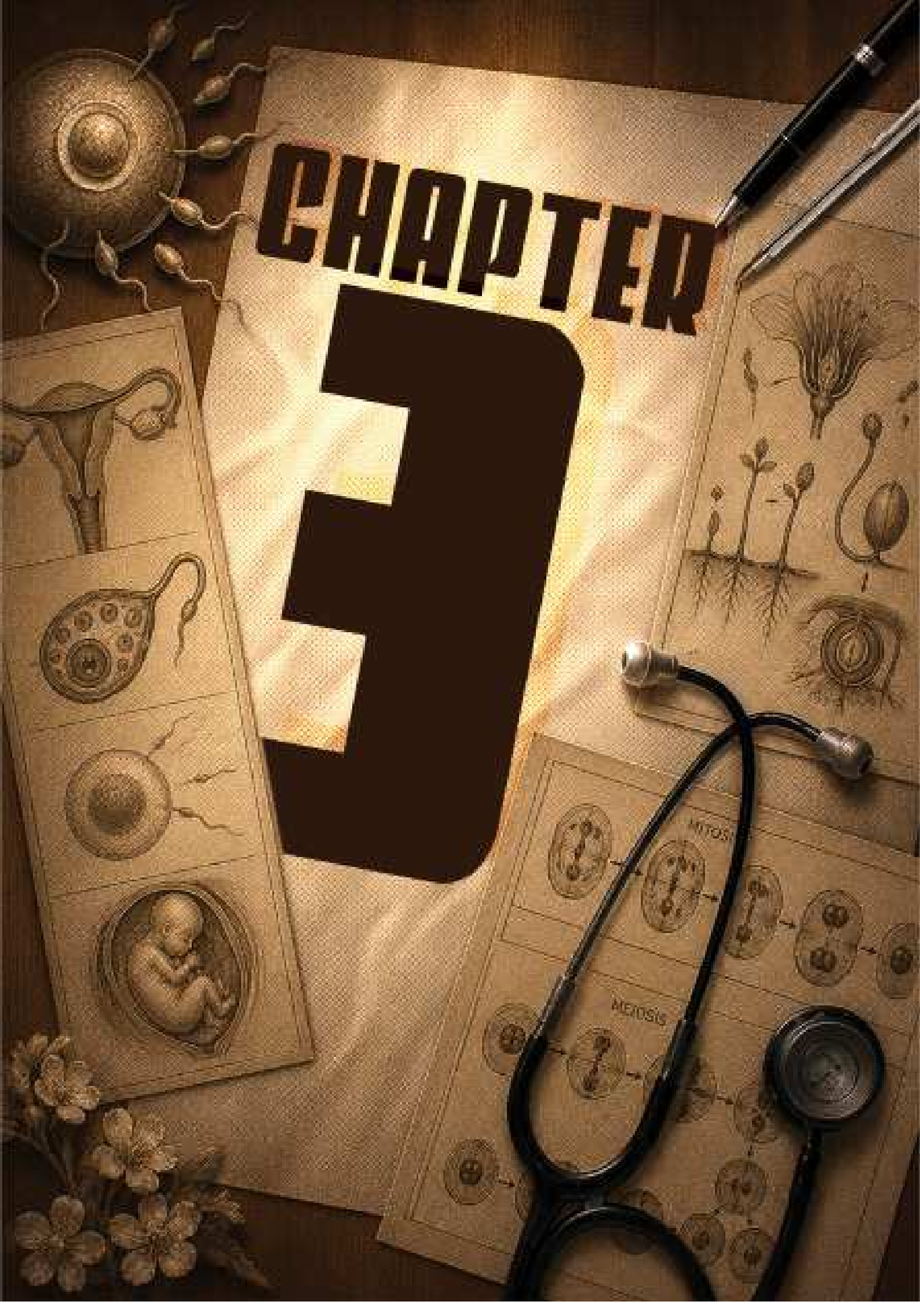

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CH3

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Reproduction is important for **continuity** and **survival** of **species** through transmission of **genetic material** to **future generations** (**not** for the life of the **individual**).

The failure of **single individual** to reproduce **doesn't lead** to the **extinction** of the **entire species**.

Living organisms **can survive without** reproductive organs.

PAS ↑ عكس ✕ ↓ Reproductive capacity

- **P** — Parental care
- **A** — Age
- **S** — Size
- **Life Nature**: Parasitic > Free-living
- **Surrounding Environment**: Aquatic > Land

Reproductive capacity among **mammals differs** due to **different number of cycles**

(Other factors such as surrounding environment are the same)

Lice (القمل) are **parasites** and **insects** which have **Low parental care**.

Sexual reproduction is **more energy consuming** (higher biological cost) than **asexual** reproduction.

WHY?

→ **Meiosis** division takes place for **gametes production**.

→ **Parental care & pregnancy period** (in developed mammals)

→ Production of **new individuals** is limited to **females only**

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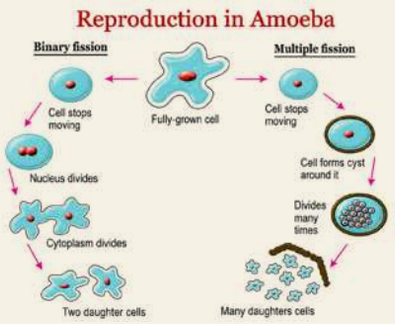
Binary fission & Multiple fission

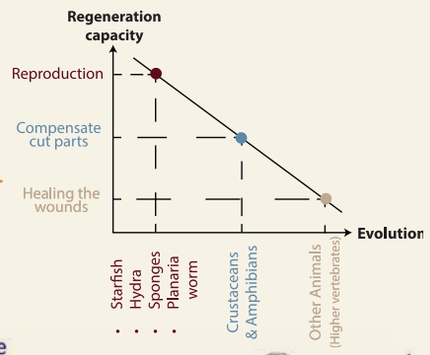
- Binary fission can occur in **Unicellular organisms**: Protozoa as Paramecium, Amoeba, Bacteria & Simple Algae
- **Remember:**
  - Paramecium → Can perform **CONJUGATION**
  - In Bacteria → **No nuclear division** occurs as it is **Prokaryotic** organism which doesn't have nucleus, **only Cytoplasmic division occurs**.



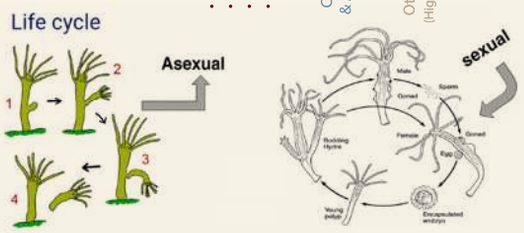
Binary fission Binary = Two ثنائي	Multiple fission
▪ **2 amoebae** are produced (**larger** in **size** compared to that produced from **multiple fission**) **But smaller in size compared to mother**	▪ **Multiple** amoebae are produced (**Smaller** in **size** compared to that produced from **binary fission**)
▪ Occurs in **Suitable conditions**	▪ Occurs in **Unsuitable conditions**

Regeneration

In **humans** wound healing is an example of **regeneration** → Depends on **mitosis**.



- Hydra and Sponges can also reproduce by **Budding** & **perform meiosis** to reproduce **Sexually** by gametes.



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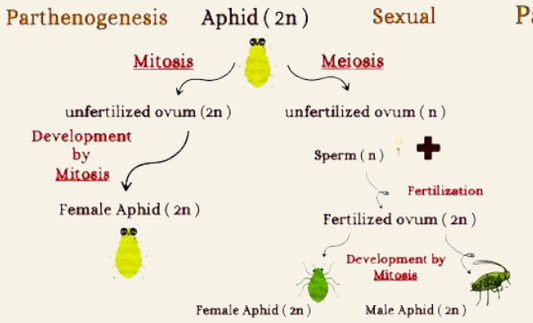
Parthenogenesis

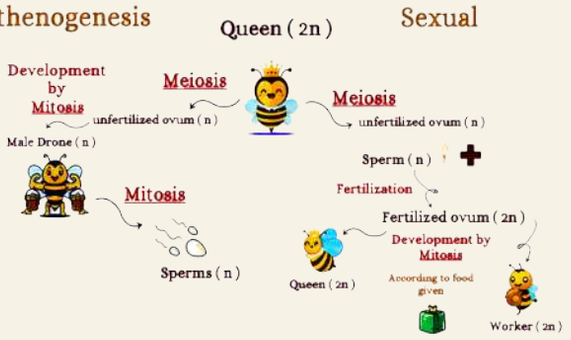
Natural

Eggs of female aphid could result from meiosis (sexual) or mitosis (asexual)	Eggs of Honey bee queen could result from meiosis ONLY (sexual) or (asexual)

Aphid



Honey bee



Artificial

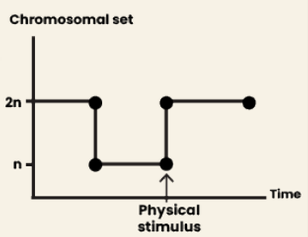
- Activation of eggs → Results in **Females ONLY**.

Artificial Parthenogenesis — Only occurs by FEMALE GAMETES & Produces Females only

New individuals — As in Frogs & Starfish

Female frog (2n) → Meiosis → Ovum (n) → Duplication of chromosomal number (2n) → New individual "female" (2n)

Artificial induction: Agitation



Asexual reproduction by artificial parthenogenesis

Early embryonic stages — As in Rabbits

Parthenogenesis in **Honey bee**	Produces **MALES** only
Sexual in **Honey bee**	Produces **FEMALES** only
Parthenogenesis in **Aphid insect**	Produces **FEMALES** only
Artificial Parthenogenesis	Produces **FEMALES** only
Cloning	Produces **Males** or **Females** (Depending on sex chromosome that the taken nucleus carries)

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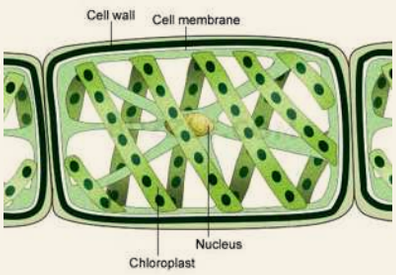
Sexual reproduction

Doesn't only occur in higher animals & plants, it **can occur** in **primitive organisms** such as: **Protozoa** (As **Paramecium**) , **Algae** (As **Spirogyra algae**) and **Fungi** (As **Bread mold fungus)**

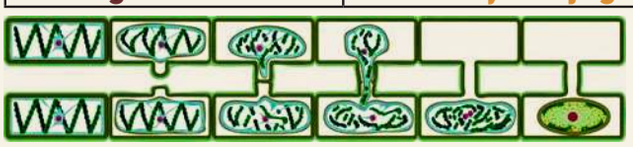
Spirogyra:

- **Autotroph** (make its own food by photosynthesis as it posses **green plastids**)
- Filamentous
- **Multicellular** algae
- Haploid
- Lives in **fresh water**

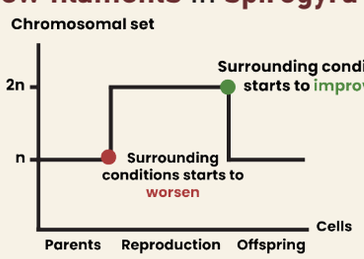


Change of **Water purity** is a **life-threatening change** in the life of **spirogyra algae** because it is an **autotroph** (depends on **photosynthesis**), so change in **water purity** would make it **difficult** for **sunlight** to reach **through** the **pond**

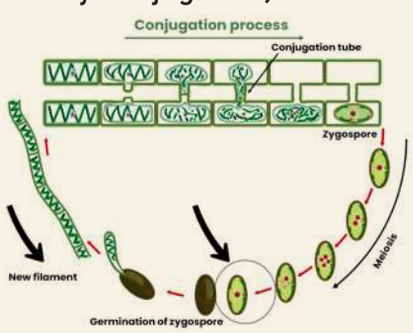
Suitable conditions	Unsuitable conditions
Performs Asexual reproduction by **fragmentation**	Change in water purity, temperature or drought affects photosynthesis → **Sexual reproduction by conjugation** forming Zygospore



- Number of **new filaments** in **spirogyra** (sexual by conjugation) = number of **zygospores**



Sexual reproduction by Conjugation



Zygospore resulting from conjugation	Zygote from sexual reproduction by gametes
Remains dormant until surrounding **conditions** are **improved**	**Divides directly** by **mitosis** after its formation

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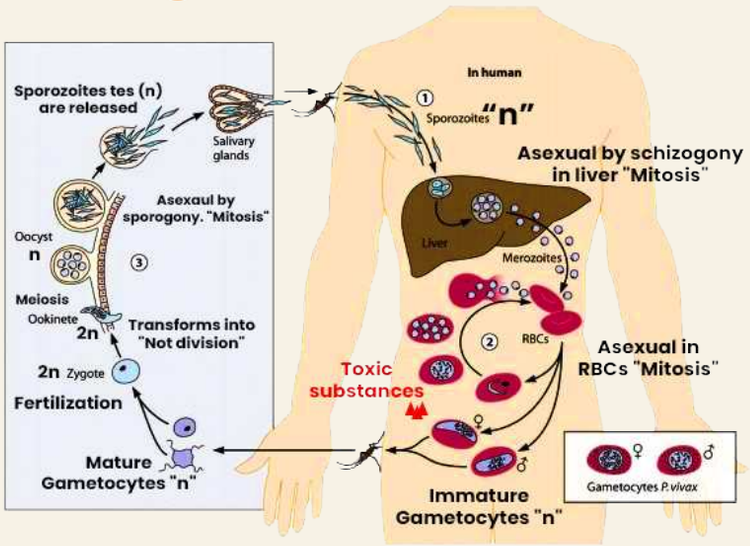
Alternation of Generations

- **Occurs** when **1 sexual generation** alternates with **1 or more asexual generations** (NOT DIFFERENT ORGANISM) in **the same life cycle.**
- Each **generation** has its **own structure** and **shape**.

Plasmodium malaria



- **Asexual reproduction** which occurs inside **human RBCs starts with** merozoites and ends with merozoites.
- Merozoite to Gametocyte is considered **transformation not asexual reproduction** (As reproduction means increase in number and this does not occur).

Merozoites	Oocyst
Results from **Mitosis** & Performs **Mitosis**	Results from **Meiosis** of Ookinete & Performs **Mitosis** (Sporogony)

- **Main host** of Plasmodium → Mosquito , **Intermediate host** of Plasmodium → Human
- **Sporogony** (Oocyst → Sporozoites) occurs in **Stomach wall**.

Examining **blood sample** of person infected with malaria	
State of blood & Substances found	Stages found
– Ruptured RBCs – Toxic chemical substances → **Symptoms appear**	– Merozoites – Gametocytes inside RBCs

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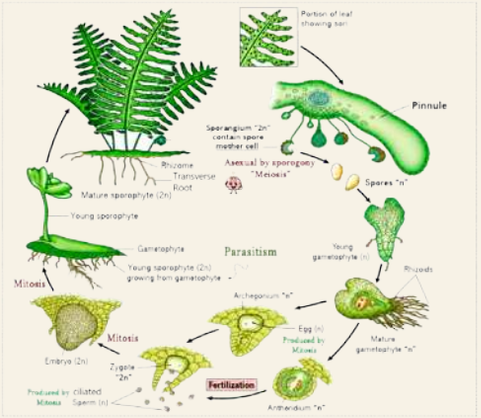
Polypodium (Fern plant)

- What is the **main factor** that affects the **completion** of asexual and sexual reproduction in the fern life cycle? **WATER .**

1. For **spore germination** (**asexual**) where spore forms the **gametophyte**.
2. For **fertilization** (**sexual**), water is a suitable medium for **transferring ciliated sperms** to the **egg cell** to **fertilize it**.



Polypodium life cycle has:

- **Quick propagation** (asexual by **sporogony**)
- **Tolerance** to **hard conditions** (**spores** have **thick coat**)

The **spore** is a **haploid cell** that has a **thick wall** and can form a **new individual**

- **Genetic variety** (**meiosis** of **spore mother cell** + **possibility** of **fertilization** between **Different gametophytes**)
  - Number of **gametophytes** in **fern** plants = number of **germinated spores**
  - Number of **Sporophytes** in **ferns** = number of **zygotes** **or** number of **fertilized eggs**

Spirogyra algae zygote	Polypodium zygote
Formed by fusion of **2 somatic cells**	Formed by fusion of **2 gamete cells**
Both are **Diploid (2n)**	

- **Male gametes that are formed by mitosis:**
  - Male gamete of **ferns** (polypodium/adiantum)
  - Male gamete of **honeybee drone**
- **Female gametes that are formed by Mitosis :**
  - Female gamete of **ferns**
  - Female gamete of **aphid insect (in asexual)**

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Collective Overview

Feature	Asexual Reproduction	Sexual Reproduction
Cellular Basis	Depends on **mitosis** (Except special cases : **Natural parthenogenesis** in **honeybees** and **Sporogony** in **polypodium** are special types of asexual reproduction)	Depends on **meiosis**
Speed	Faster	Slower
Energy Consumption	Less	More
Biological Cost	Less	Higher
Offspring number	More	Less
Genetic Traits	Stability of genetic traits	Genetic diversity
Number of Individuals Involved	1 individual	More than 1 individual (Except special cases : **Lateral conjugation** in organisms like **spirogyra** & fertilization of egg cell on the same gametophyte)

Worms can:

1. Be **hermaphrodite**
2. Have **polyploid cells**
3. Reproduce **asexually** by **regeneration** (planaria)
4. Reproduce **asexually** by **natural parthenogenesis**

Algae can perform:

1. **Binary fission** (**simple** algae)
2. **Sporogony** (**some** algae)
3. **Conjugation**

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	Amoeba	Spirogyra	Bread mold fungus
Method & type of reproduction in suitable conditions	Asexual by Binary fission	Asexual by Fragmentation	Asexual by Sporogony
Method & type of reproduction in unsuitable conditions	Asexual by Multiple fission	Sexual by Conjugation	Sexual by Conjugation
Type of cell division in suitable conditions	Mitosis (chromosomal number is constant)		
Type of cell division in unsuitable conditions	Mitosis (chromosomal number is constant)	Meiosis then mitosis	Meiosis then mitosis

Similarity: **having a stage that protects them** from **harsh conditions**: **chitinous cyst**, **zygospore** & **spore** respectively.

Important note: Spores in bread mold fungus are formed in normal **conditions** not as the others → hard conditions.

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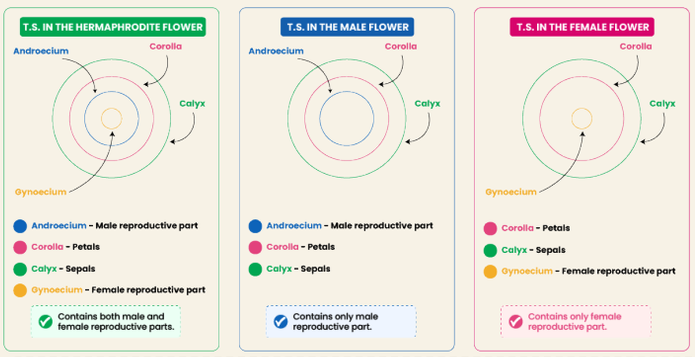
Chapter Three

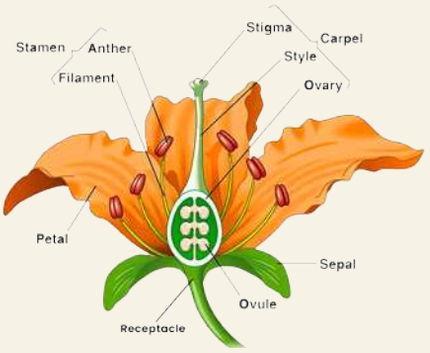
Reproduction in Flowering plants

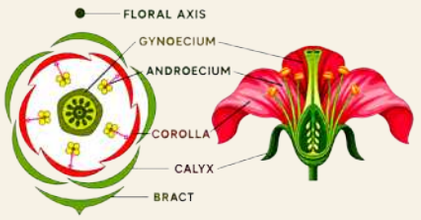
Pollination → Fertilization → Seed formation

Flower whorls :

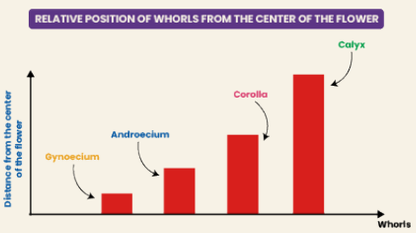
Whorls	Leaflets = Composed of
Calyx	**Sepals**
Corolla	**Petals**
Androecium	**Stamens** "Anther + Filament"
Gynoecium	**Carpel** "Stigma + Style + Ovary"







Plant whorls can have **different number** of leaflets inside each of them.



- Hermaphrodite flowers have both **androecium** and **gynoecium**.
- Male flowers have only **androecium**.
- Female flowers have only **gynoecium**
- **Gynoecium** is the **4th whorl** in all **hermaphrodite** flowers.

Calyx	Corolla
Leaflets: Sepals	**Leaflets: Petals**
Both **have pigments** in their leaflets	
Protection of parts of the flower **in case of bud**	Protection of sexual organs **after maturation**

NOTE

Perianth are **2 separate whorls but only can't be differentiated** because they have the same color

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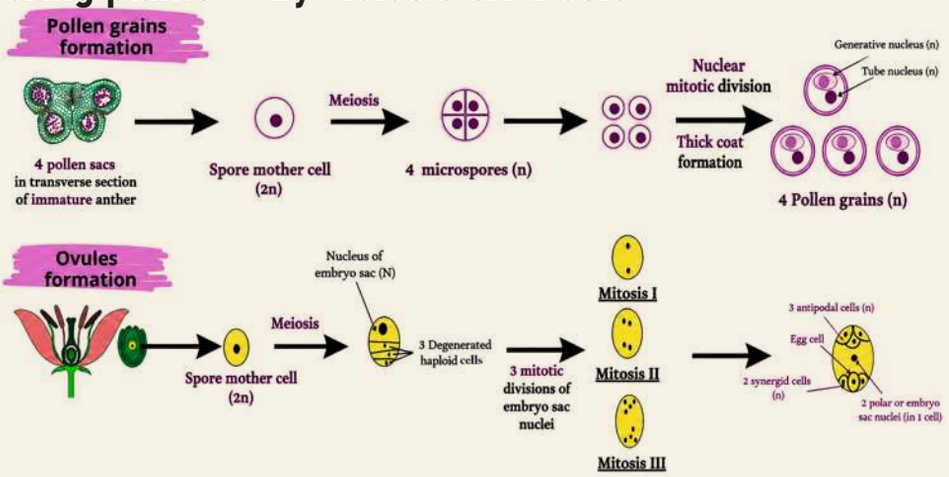
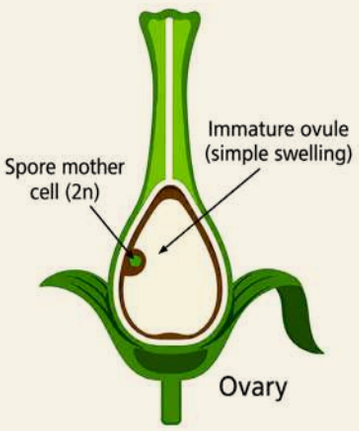
Formation of Gametes in:

1. Flowering plants → By Meiosis & Mitosis



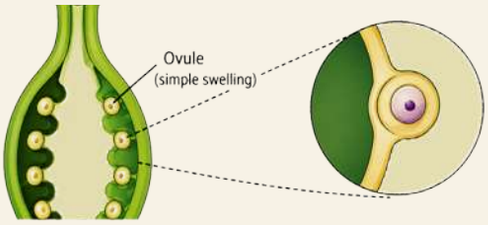
- Pollen grains are **more exposed to loss** , so their **number** is **always more** than that of **fertilized eggs**.
- **1 Meiosis → Form Embryo sac BUT 3 Mitosis → Maturation** of **Embryo sac** (**Ovule**)
- Chromosomal set of pollen grain is **N** although it has **2 nuclei** .

The ovule appears as a **simple swelling** in the interior of the **ovary wall** during **formation of ovules** and it contains **large diploid spore mother cell** (2N)



Each **ovule** gives **1 seed:**

- Some fruits have **more than one seed**, therefore we will find **more than 1 spore mother cell** (Swelling)
- **Mango** → 1 Seed
- **Watermelon**→ Many seeds



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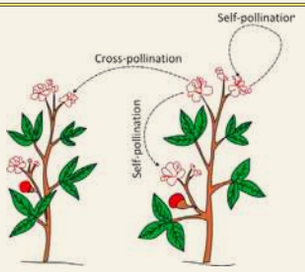
Pollination

Process by which pollen grains are transferred from anther to stigma

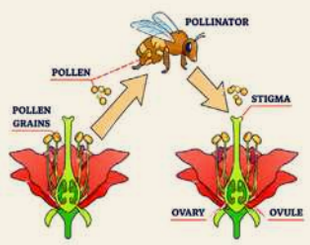
- Self pollination → Occurs within **SAME plant individual or SAME flower.**
- Cross pollination → Occurs between **different plant individuals** BUT of the same species.

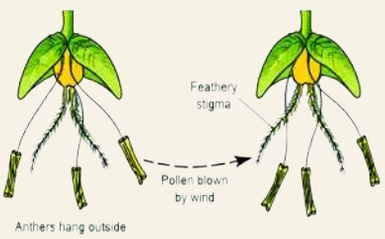


Can be affected by :

- **Wind – Water – Human – Insects** → **Transfer** of **pollen grains**.
- Shape of **stigma (sticky or feathery)** → **Insect** VS **Wind** pollination

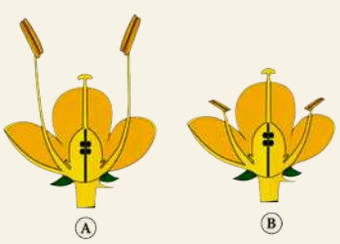
Wind pollinated stigmas **extend outside** the flower with a **feathery** or **branched** structure





- **Height** of **anther** & **stigma** – **Time** of **maturation** of each

→ Determine **Type** of pollination (**Self** or **Cross**)



Number of ovules → **Doesn't affect pollination** itself, it **Affects** number of **formed seeds**.

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NOTE

- **Cross pollination** helps achieve **genetic diversity** → **New desirable** characters may **emerge** (such as broad beans).
- **Self pollination** → **Low genetic variation**
- **Occurrence** of **cross pollination** could **reduce** the **probability** of **producing plants** with **genetic defects**.

Fertilization in flowering plants

The **generative nucleus & the tube nucleus** do **not share directly** in double **fertilization**.

- **Tube** nucleus → **pollen tube** (Without division) → **Delivers the male nuclei** to the **ovule** to **achieve double fertilization**.
- **Generative** nucleus → **2 male nuclei** → For **double fertilization** to take place, **mitosis** division of **generative nucleus** is a must.

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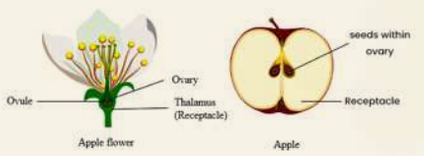
- **Two male nuclei** are required during **Double fertilization** , BUT **only 1 male nuclei** is needed to **form the Embryo** & the **other** is needed to **form the Endosperm**
- **Double fertilization** has a role in **embryo nutrition** → as it forms **endosperm**

Fruit

Definition → A **mature ovary** (storing **food**) and has a **pericarp**.



Cause of formation → **Ovary** storing **food** due to **auxins** effect which are **secreted** by the **ovary** (due to effect of **pollination**)

False fruit → A **false fruit** is **false** because the **OVARY does not store food** to **form the eaten part of the fruit** **BUT** the fruit **still contains the ovary** in their structures

"Any other part other than ovary stores food"

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Fruit with Seed(s)	Seedless fruit
Considered reproduction → (Fertilization)	**Not considered** reproduction → Parthenocarpy

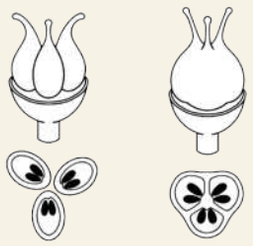
REMEMBER

Natural Parthenocarpy can be seen **NATURALLY** in Banana & Pineapple

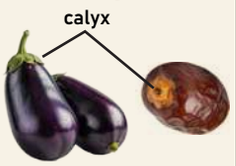
	Pineapple	Apple
Pollination	Yes	Yes
Fertilization	No	Yes
Seeds	No	Yes
Hormonal activation for fruit formation	Yes → Ovary (eaten part)	Yes → Receptacle (eaten part)

Number of Carpels & Produced fruits

- No. of **Separated Carpels** = No. of **ovaries** = No. of Produced **Fruits**.
  Ex: A flower has 10 separate carpels → 10 fruits are produced.
- If **carpels** are **fused** → **1 ovary** → **1 Fruit** is produced with locules.
  Ex: A flower has 5 fused carpels → 1 Fruit is produced with 5 chambers (locules).



Whorls fate after fruit formation

Remaining parts in the fruit			
Apple	Pomegranate	Marrow	Eggplants & dates
has **ovary** + **receptacle**	has **ovary** + **calyx** + **stamens** remaining	has **ovary** + **corolla** remaining	have **ovary** + **calyx**
	POMEGRANATE Leaves of calyx and stamens remain	**MARROW** Leaves of corolla remain	

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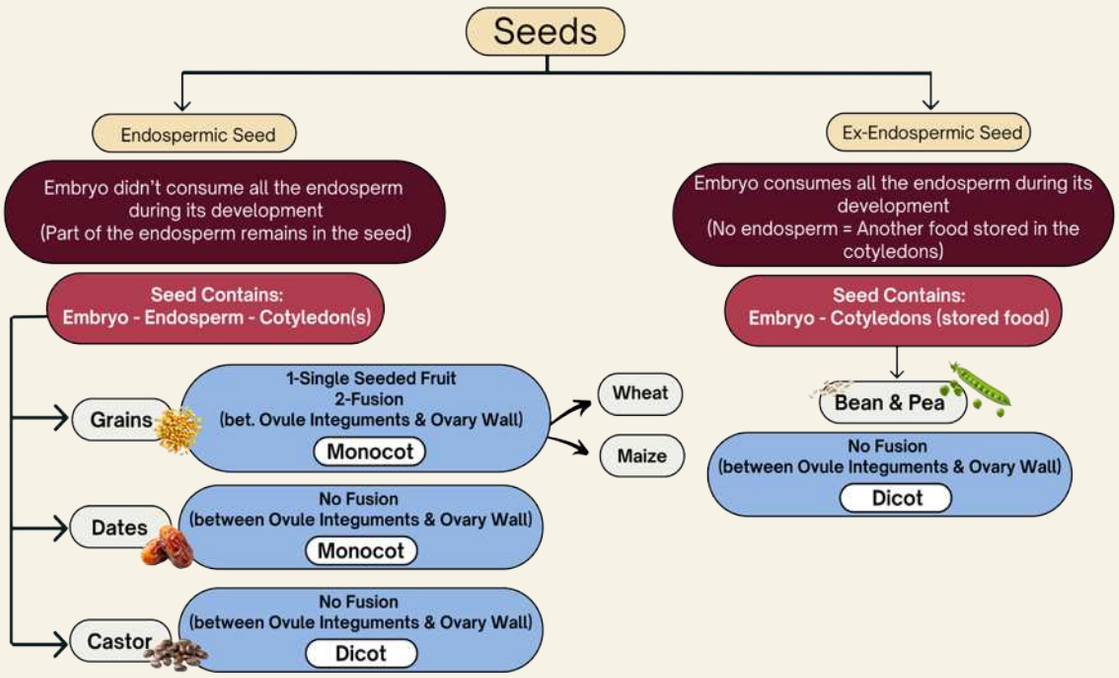
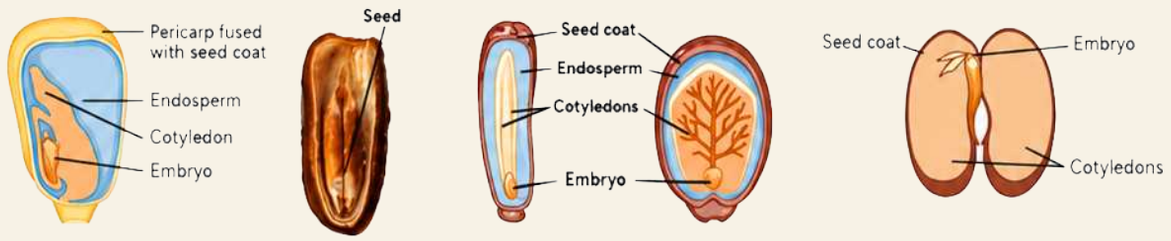
Endospermic seeds VS Ex-Endospermic seeds

Endospermic seed		Ex-Endospermic seed
Embryo **did not consume** all the endosperm	During its development على الشجرة	Embryo **consumes** all the endosperm
Embryo feeds on **Endosperm**	During its germination في الطينة	Embryo feeds on **Cotyledons**



The **cotyledon** or the **two cotyledons do not store food,** as the **remaining endosperm** is **sufficient** for the embryo during **seed germination**.

The **2 cotyledons store food** in **ex-endospermic seeds** needed for **seed germination.**



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- **Both** endospermic and ex-endospermic seeds **contain** the **necessary nutrients** for the **growth** of the **embryo** during germination

Endospermic seeds→ **Endosperm**

Ex-endospermic → **Cotyledons**

- Notice that **Embryo** **does not feed on the nucellus**

(It was consumed before fertilization by the ovule and embryonic sac contents)

- **Ex-endospermic** seeds only **have diploid cells after maturation** (as they have no endosperm)

Main purpose of **sexual reproduction** in plants ?

Production of **seeds**

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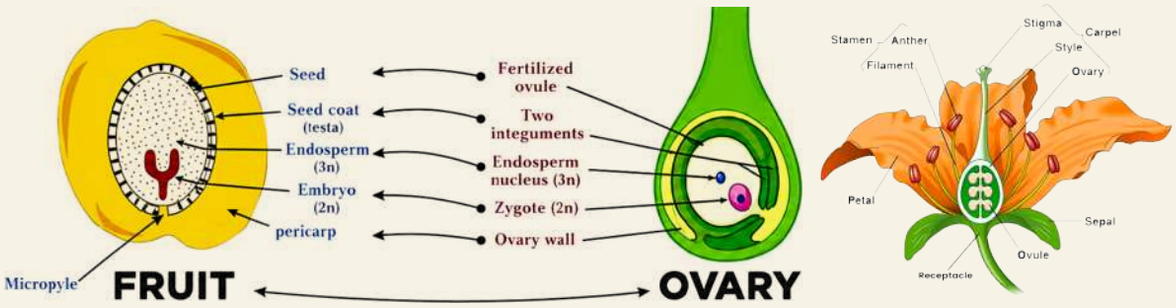
Plant Part	Function / Role
Fruit	1. **Protection** of **seeds** (In **Angiosperms** , **Seeds** develop **within a pericarp**) 2. Aids in Seed **dispersal** انتشارها
Ovule	**Seed** formation → **AIM of Reproduction***
Ovary	**Formation** of **fruit**
Endosperm	Provides **nutrition** (food) for the **embryo within the seed**
Corolla	1. **Protects** flower's sexual parts 2. **Attracts** insects for **Pollination** (**Before fertilization**)
Calyx	**Protect** inner parts of flower **against** drought , rain or wind
Receptacle	-**Carries** all parts of a flower. -**Stores** food in case of **false fruits** (as Apple).



Plant Part	Definition
Receptacle	Swollen top of Pedicel (flower stalk)
Ovary	The **swollen base** of the carpel
Seed	**Fertilized ovule** containing an embryo
Fruit	Mature ovary
Gynoecium	**One** or **more** **free** or **fused** carpels
Grain	Single seeded fruit

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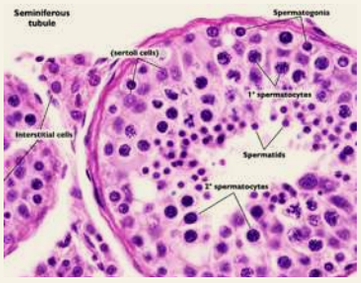
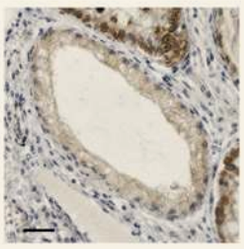
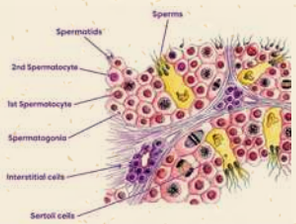
Reproduction in Human

- Presence of **Testes outside the body** → To maintain testes at **Cooler temperature** → Suitable for **Spermatogenesis**.
- **High temperature inside** the body → **Not suitable** for **gamete forming** cells (of seminiferous tubules) **BUT still suitable** for of **male sex hormones production**



↑ Temp. →



	Sertoli Cells (2n)	Interstitial Cells (2n)
Location 	**Wall of seminiferous tubules**	**Between seminiferous tubules**
Function	**Direct** role in sperms nutrition : ▪ Secrete **nutritive fluid** (**Nutrition** & **Immunization**)	**Indirect** role in sperms nutrition : ▪ Secrete **androgens** →**Growth of Seminal vesicles** →secrete an **alkaline fluid containing fructose**
Affected by	**FSH**	**LH**

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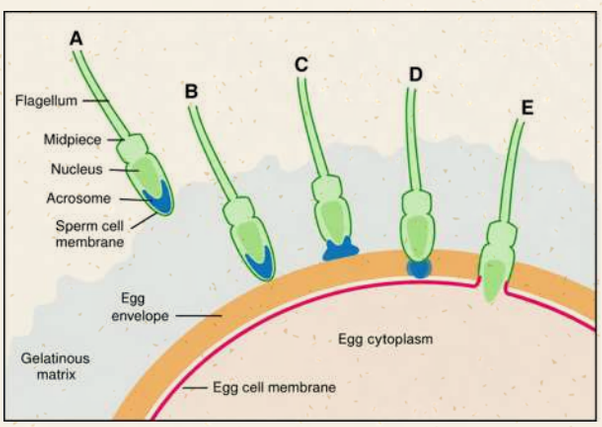
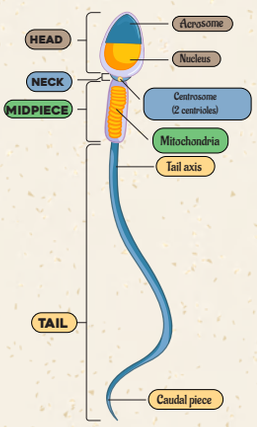
Sperms vs. Ova

Sperm	Function / Role
Tail + Middle piece ↓ (That has Mitochondria for ATP production)	**Movement** & **Arrival** of sperms to ovum
Acrosome	**Penetration** into ovum → Hyaluronase enzyme
Centrioles	**Division** of fertilized ovum





- The part of sperm that use **secretion of Seminal vesicles** "Fructose" → **Mitochondria** in middle piece
- Acrosome of sperm is **formed** during **Metamorphosis stage**.

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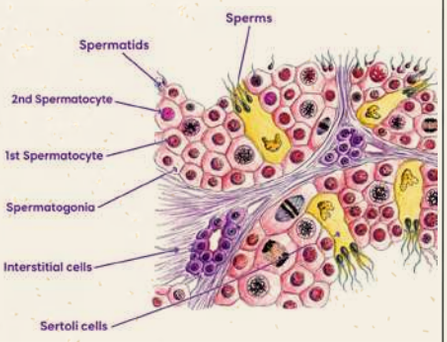
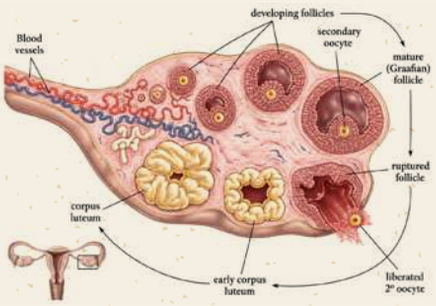
	Testes	Ovary
		
Differences	• **Spermatogenesis** begins at **puberty**.	• **Oogenesis** begins during **embryonic development** **(growth & multiplication phases are completed)**
	• **Testes** functions **outside** the **body**. • Testis **doesn't stop**.	• **Ovary** functions **inside** the body. • Ovary **ceases** (**stops**) to **function after a certain age (menopause)**
	• **Internal structure** (**seminiferous tubules** & **interstitial cells**)	• **Internal structure** (**Immature follicles** – **GF** -**CL**)
	• **Permanent endocrine** structure → **Interstitial cells** → **Male sex hormones**	• **Temporary endocrine** structures → **Graafian follicle** & **Corpus luteum** → **Female sex hormones** • **Ovary** can secrete a **proteinic** hormone (**Relaxin**)
	• **Meiosis** in human males → occurs in **seminiferous tubules**	**Meiosis-I** in human females → occurs in **GF** • **Meiosis II** in **Fallopian tube** (at moment of **entry of sperm before fusion** of male and female nuclei
Similarities	1-Both are **mixed** glands. 2-Their **hormones** are secreted **after puberty**. 3-Both secrete **steroidal** hormones.	

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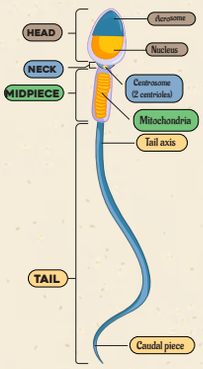
Sperms nutrition

Sperms depend on **fluids** secreted by :

- **Seminal vesicles** (**outside** the **testes**) → **Fructose sugar**
- **Sertoli** cells (**inside** the **testes**) → **Nutritive fluid**

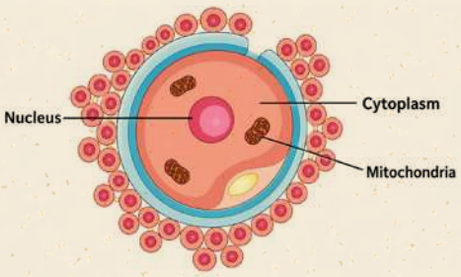
N.B: they **lose** most of their **cytoplasm** for **easier movement**.



Ovum nutrition

Ovum has a **large** amount of **cytoplasm**:

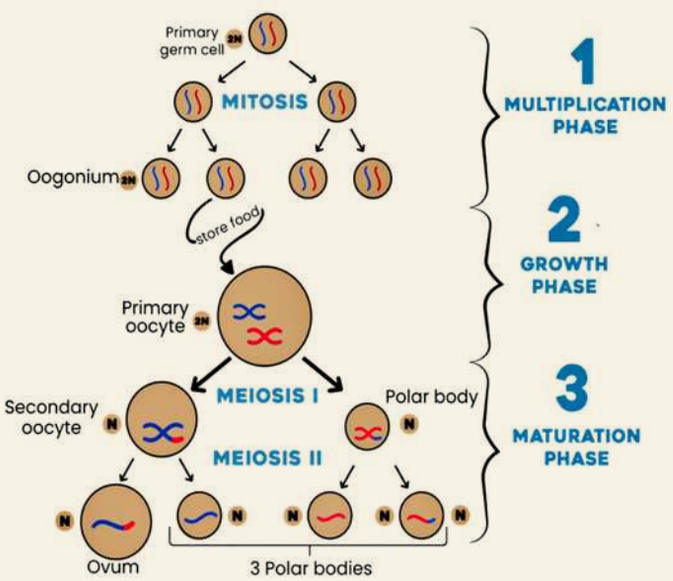
- **Before fertilization** → **ovum** nutrition
- **After fertilization** → **zygote** nutrition



Spermatogenesis vs. Oogenesis

– The importance of Forming **3 polar bodies** during oogenesis:

- Reduction of **chromosomal number** (result from meiosis division)
- allow the ovum to **store food** (it has a bigger size)



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NOTE

- Human female is born with **primary oocytes** in her ovaries.
- In **Meiosis** I "A stage in which chromosomes are **reduced by half**" → **Crossing over** occurs → Production of two **chromosomally different** types of cells

Gamete formation in Humans by Spermatogenesis & Oogenesis	Gamete formation in flowering plants
Mitosis then meiosis	**Meiosis then mitosis**

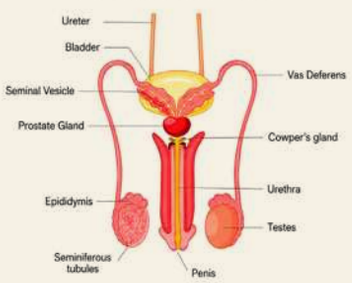
NOTE

Semen

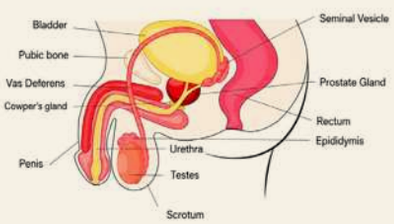
Q: Why semen contains fructose and not glucose?
A: fructose **doesn't** need **insulin** to **enter** cell (**sperm**)

- Semen should be **alkaline** to allow sperms to **survive**.
- Semen should contain **fructose** for **nutrition**.
- Semen **doesn't contain testosterone**.

Posterior view



Lateral view



Site of Obstruction	Effect on Semen / Fertility
– 2 Vas Deferens	– Semen with **No** sperms
– 1 Vas Deferens	– Semen **with sperms** (fertile)
– **Seminal vesicles** ducts **Or** **Prostate ducts** (with Cowper's)	– Semen with **Dead sperms**
– Urethra (**common** between **Urinary** & **Genital** systems)	– **No** Semen + **No** Urine
– Ureter	– **No** effect on fertility

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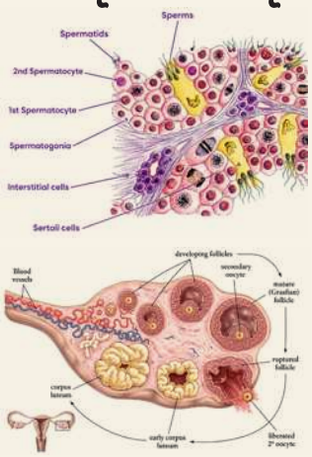
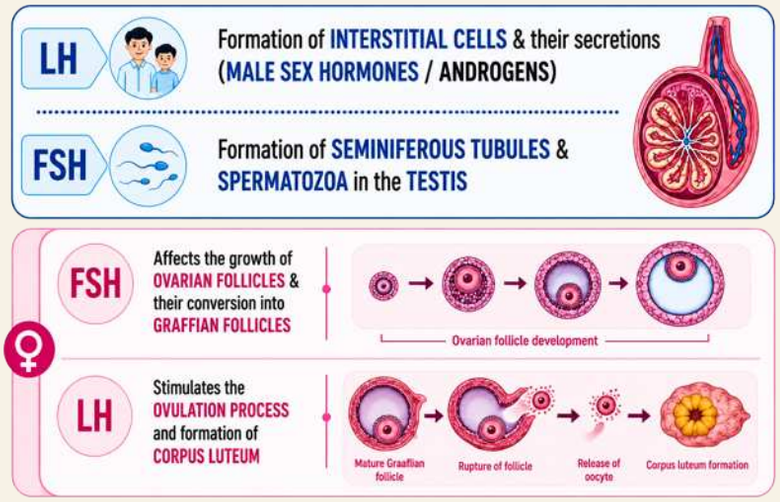
FSH & LH




LH
Formation of INTERSTITIAL CELLS & their secretions (MALE SEX HORMONES / ANDROGENS)
FSH
Formation of SEMINIFEROUS TUBULES & SPERMATOZOA in the TESTIS
FSH
Affects the growth of OVARIAN FOLLICLES & their conversion into GRAFFIAN FOLLICLES
Ovarian follicle development
LH
Stimulates the OVULATION PROCESS and formation of CORPUS LUTEUM
Mature Graafian follicle
Rupture of follicle
Release of oocyte
Corpus luteum formation

FSH is responsible for occurrence of **proliferation** phase (where **meiosis-I** of **oocytes** leads to **formation** of **2ry oocyte inside the maturing follicle**) **NOT** **meiosis-II**

- So, if **oestrogen decreases** → by **-ve feedback** → **FSH increases**
- If **any damage occurs to FSH receptors : No division** for immature ovarian follicles → So, **no formation** or **Growth** of Graafian follicle → So, **no** Estrogen secretion & **Non-occurrence** of Meiosis I

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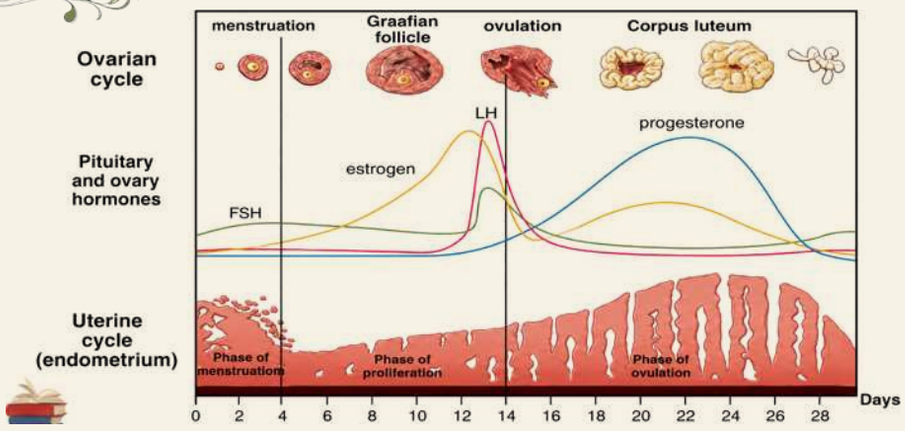
NOTE

Menstrual cycle :



Menstrual cycle includes both

Ovarian cycle

- Regulated by → **Pituitary** hormones **(FSH & LH)**

Uterine cycle

- Regulated by → **Ovarian** hormones (**Estrogen & progesterone**)

F Acts on → Ovary

E Acts on → Endometrium of uterus

L Acts on → Ovary

PE Acts on → Endometrium of uterus

- **Maintain** uterine lining → **Progesterone**
  Rebuild endometrium → **Estrogen**
- Hormone stimulates the **beginning of uterine activity** in an adult female → **Estrogen**
- Hormone stimulates the **beginning of ovarian activity** in an adult female → **FSH**

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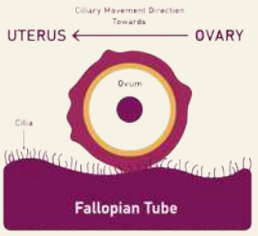
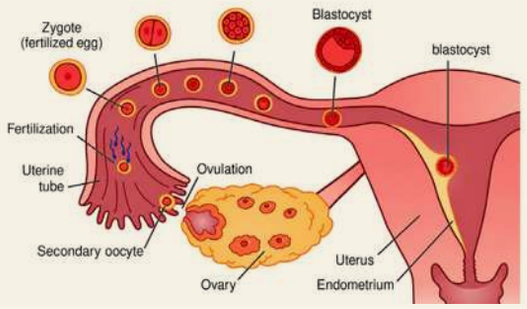
Fertilization & Pregnancy :

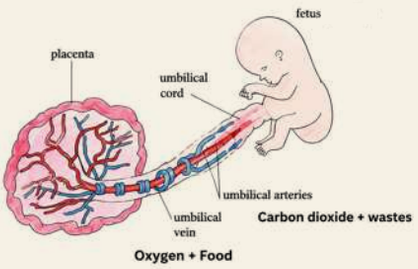


- **Cilia** of the **fallopian tube** beat towards the **uterus** → helps **transfer** the **fertilized ovum** towards the **end of the fallopian tube** to reach the **uterus for implantation.**
- Cilia **don't help** the **female gamete** to **exit the ovary** toward the fallopian tube.
- Cilia **don't push the sperm inside the ovum** (function of **sperm** itself).

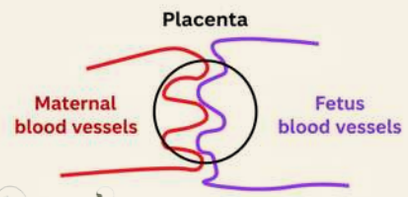


Embryonic membranes , Placenta & Trimesters :

Blood vessels in the umbilical cord belongs to **FETUS only**



Blood vessels in the placenta belongs to **FETUS & MOTHER**



NOTE

- **Protecting** the child from shock and dryness → **Amniotic** fluid
- The system which takes the **longest period of time** between **starting development** and **completion** is **the Nervous system:**
  - The nervous system **starts its development** → **First** trimester
  - The **development** of the brain is **completed** → **Third** trimester
- **Lowest rate of mitotic divisions** during embryonic development → **3rd stage (trimester)**

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NOTE

Placenta is separated from the uterine wall and is **expelled** outside the uterus **after birth of fetus.**

The figure shown has the following characteristics:

- The **development** of the **brain** is **completed**.
- The development of the **other internal systems is completed.**
- The **growth** of the embryo in size **slows down**.
- **Sex** can be **determined**
- **Heart** is fully **formed** & **beating**
- **Skeleton** is **formed**

BUT TAKE CARE → **NO** CL IN OVARIES of the mother

(PLACENTA TOOK OVER AT THE BEGINNING OF THE 4TH MONTH)

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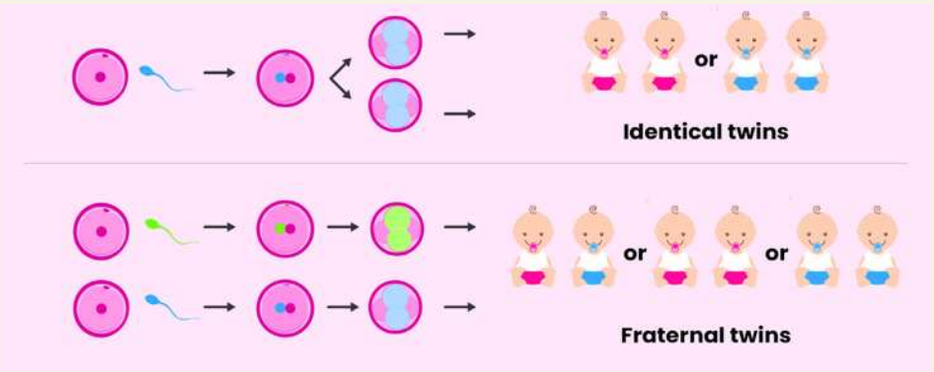
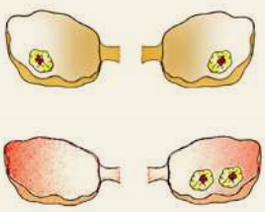
Twins



The presence of **2 CL before the 3rd month of pregnancy** (in 1 ovary or in 2 ovaries) could mean:



- Formation of **fraternal twins** (2 males – male & female– 2 females).

The presence of **1 CL before the 3rd month of pregnancy** could mean:

- Formation of **1 baby** (male or female)
- Formation of **identical twins** (2 males – 2 females)
- Formation of **Siamese twins** (have 1 amnion)

NOTE

- **Identical (Monozygotic) twins share one placenta, but the amniotic sac may be one or two (2 is more common)**
- **Each embryo must have its own separate umbilical cord to deliver blood from the placenta.**
- **(Rarely)** We can find **Siamese twins** sharing **one umbilical cord** if they are **fused from the abdomen**

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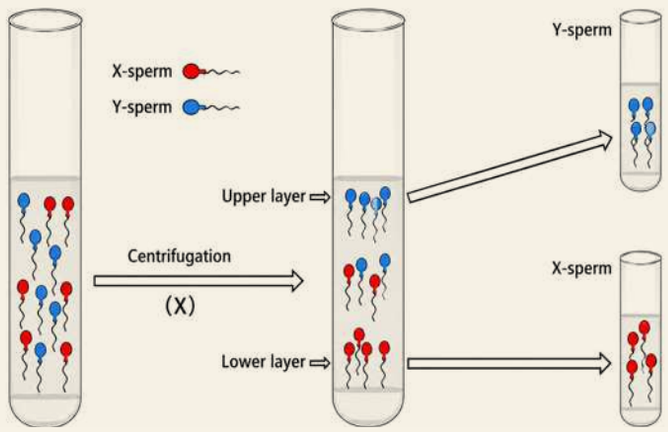
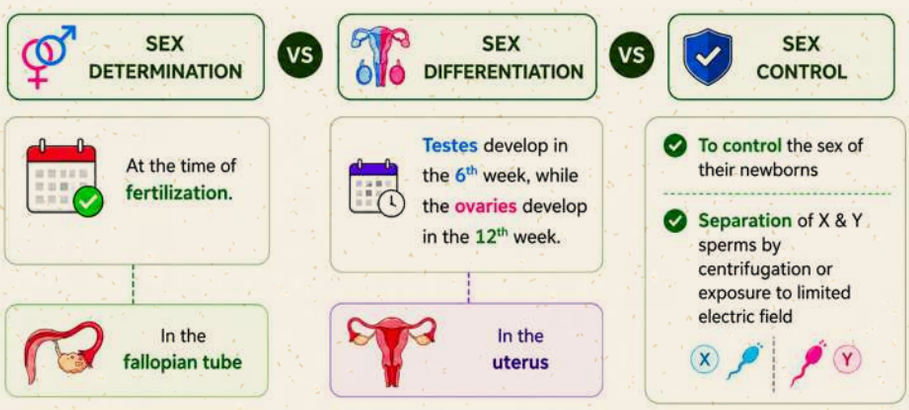
Sex control

- **Less dense sperms (Y)** → used for **Male production**
- **More dense sperms (X)** → used for **Female production**



- Separation of **sperm X** from **sperm Y** → **Controls** the **Sex** of the embryo (**male** or **female**).
- Separation of **NORMAL sperm** from **ABNORMAL sperm** → in IVF to produce offspring **free from genetic abnormalities**.


SEX DETERMINATION
VS
SEX DIFFERENTIATION
VS
SEX CONTROL
At the time of fertilization.
In the fallopian tube
Testes develop in the 6th week, while the ovaries develop in the 12th week.
In the uterus
To control the sex of their newborns
Separation of X & Y sperms by centrifugation or exposure to limited electric field
X
Y

- **6th week → within 2nd month**
- **12th week → end of 3rd month**

So, if a **pregnant woman** has **ultrasound** in her **2nd month** & **sex** could **not be determined** → the **baby** is **mostly** a **female** (her **ovaries** are **yet** to **develop**).

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Birth control

Pills :

- **inhibits FSH & LH** → No **GF or CL** in the **ovary**
- If **GF & CL (✔)** → think of **other methods** of **contraception**
- Affect **menstruation/ovulation/oogenesis** → which **stops** till **stopping** the **pills**

Surgical Sterilization

Surgical sterilization in male	Surgical sterilization in female
• **Sperms can not reach** the **female genital system** at all • This man **can** mate and **still ejaculate semen without sperms**	• **Sperms can reach** the **female genital system**, but **cannot reach the oocyte** and **fertilization doesn't take place**.

Ovulation Does not occur

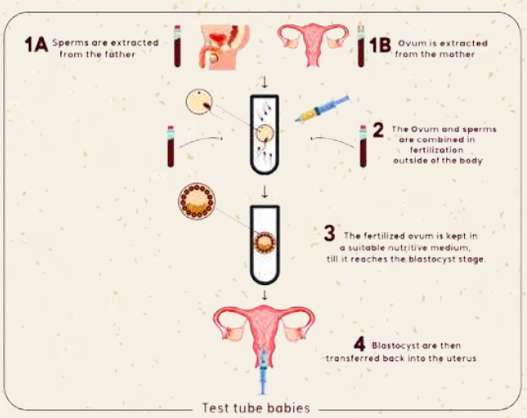
- **During pregnancy**
- In **menopause** (**Ovary inactive** → Decrease female sex hormones → **Wrinkled endometrium** & **stoppage of menstruation**)
- When Taking **birth control pills** (Contains **synthetic progesterone** & **oestrogen**)

Test tube babies

In test tube babies (in vitro fertilization)

Embryo formation starts when fertilization occurs IN THE TEST TUBE.

(With a nutritive medium) and **continues growth** till the **end of 9th month in the uterus**


1A Sperms are extracted from the father
1B Ovum is extracted from the mother
2 The Ovum and sperms are combined in fertilization outside of the body
3 The fertilized ovum is kept in a suitable nutritive medium, till it reaches the blastocyst stage
4 Blastocyst are then transferred back into the uterus
Test tube babies

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Let's summarize different artificial techniques as examples of asexual reproduction :

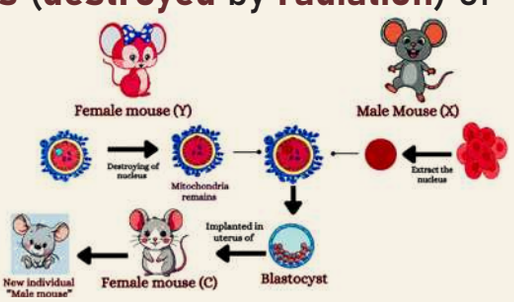
The technique	Takes place in
Artificial parthenogenesis	**Frogs**, **starfish** (**successfully**) but **failed** in mammals as it stops at early embryonic stage in **rabbits**
Tissue culture	**Only** in **plants**
Cloning	As in Dolly sheep (Mammals)

Tissue culture

- Important for Propagating **rare plants** + those with **desirable strains** + those **resistant to disease** **BUT** **NO NEW TRAITS APPEAR.**
- Needs a **semi-natural nutritive medium** (**coconut** milk).
- Requires **more technical skills** than traditional known methods and is **more expensive.**
- All Divisions in **Tissue Culture** "Asexual Reproduction" is done by **mitosis** → **Chromosomal number is constant** during different stages of development
- Number of individuals produced by **tissue culture** = number of **pieces put in the nutritive media**

Cloning

- **Nucleus** of **somatic** cells (or **embryonic** cells) **2N** of individual **X**.
- **Unfertilized** ovum **devoid** of **nucleus** (**destroyed** by **radiation**) of individual **Y**.
- **Modern** → **not** **necessarily embryonic cells, just somatic body cells.** (eg: breast cells)



- **New individual :**

i. Has Nuclear (main) **DNA** of **X** & **mitochondrial (circular) DNA of Y**
ii. Has **same characters** (shape, colour , etc.) as **X**
iii. Gets **mitochondria** (and other organelles) from **Y**
iv. Gets **nutrition** during embryonic development from **C**

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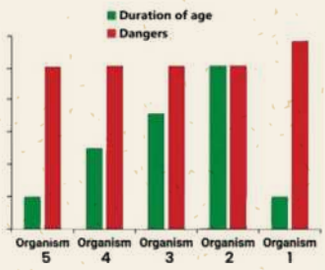
Questions Ch3

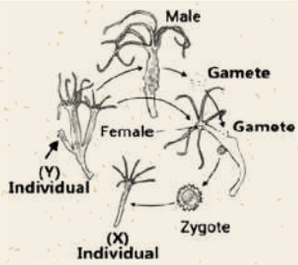
High level

1 The figure shows the duration of age and dangers facing 5 organisms. Which organism produces the least offspring and the most offspring respectively?



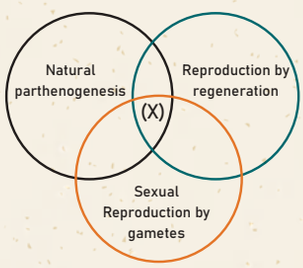
A 2-1
B 5-1
C 3-4
D 1-3

2 Study the figure that shows methods of reproduction in hydra. What distinguishes individual Y from X?



A Higher ability to tolerate difficult environmental conditions.
B More variation in its genetic traits.
C Its formation requires a lower biological cost.
D Depends on meiosis division to be formed.
E Can form colonies.

3 Which of the following represent organism X?



A Insects
B Crustaceans
C Worms
D Amphibians

4 Study the given table well. Which of the following organisms represent tobacco plant and bread mold fungus respectively?

Organism	Green plastids	Asexual Reproduction	Spore production	Gamete production	Sexual Reproduction by somatic cells
(A)	✓	✓	✗	✗	✓
(B)	✗	✓	✓	✓	✓
(C)	✗	✓	✓	✗	✓
(D)	✓	✓	✗	✓	✗

A B-A
B A-B
C D-C
D C-D
E D-A

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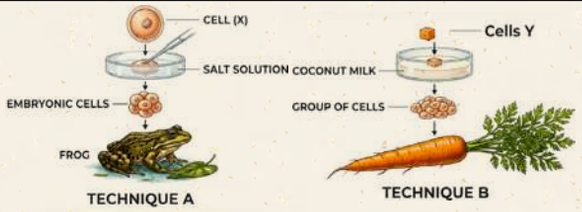
5 **Study the two shown techniques well and choose the unsuitable statement.**

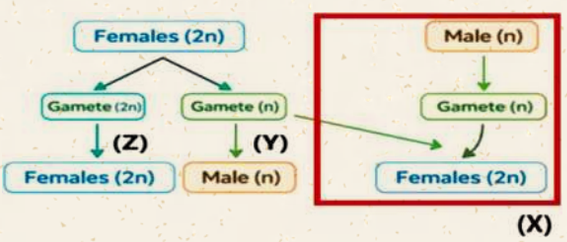


A Cell (X) is produced by meiosis division.
B Technique (B) is used to form plants with higher numbers and better resistance to diseases.
C Cells (Y) are distinguished by having the whole genetic material of the plant.
D Cell (X) is a gamete cell while cells (Y) are somatic cells.
E Technique (A) results in females only.

6 **Which of the following forms the least and highest number of new individuals respectively?**

A 1-2
B 4-2
C 1-4
D 4-1
E 2-3

7 **Study the diagram that represents details of reproduction in Rotifer animal. Answer the following questions**



1- Which of the shown steps represent parthenogenesis?

A Z only
B Y and Z
C X and Y
D X, Y and Z

2- The steps X and Z, are similar to that occurring in .... respectively.

A Aphid Insect - Honeybee
B Honeybee - Aphid insect
C Honeybee - Honeybee
D Aphid insect - Aphid insect

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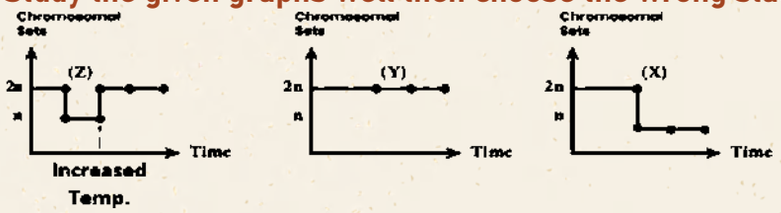
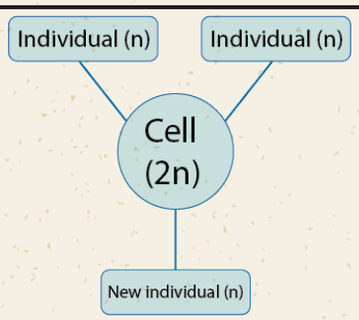
8 **Study the given graphs well then choose the wrong statement.**



A X represents gamete formation in aphid insect female and male.
B X represents asexual reproduction in honeybee queen.
C Y represents reproduction of an eukaryote under suitable or unsuitable conditions.
D Z represents formation of female or male offspring.
E Y represents formation of colonies or a chitinous cyst.

9 **Which organism is represented by the given figure?**

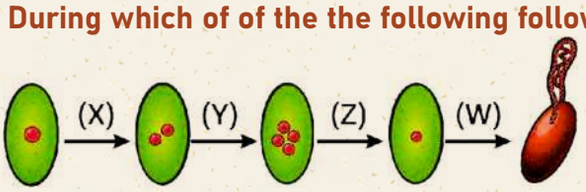


A Honeybee drone.
B Aphid insect female or male.
C Spirogyra algae.
D Gametophyte of Polypodium

10 **Which of the following organisms can reproduce during drought condition using a type of reproduction that increases its genetic diversity?**

A Spirogyra algae
B Paramecium
C Bread mold fungus
D All of the above

11 **During which of of the the following following no no divisions take place?**



A X
B Y
C Z
D W

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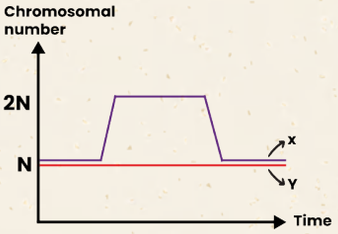
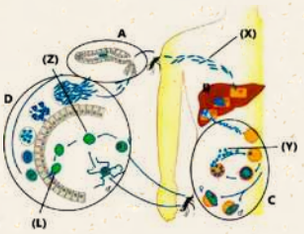
12 **The following diagram shows the change in the chromosomal set in the cells of two algae, (X) and (Y), in two different ponds. Choose the correct statement.**



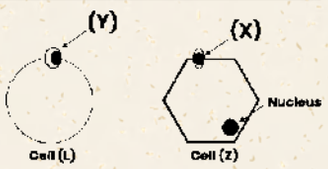
A. A zygote is formed in both X and Y.
B. Reduction division takes place in Y.
C. Mitosis division takes place in Y only.
D. X will form a new filament faster than Y.
E. Change in temperature or amount of water occurred in pond of X.

13 **Study the figure that shows the Lifecyle of Plasmodium Malaria. Choose the correct statement.**



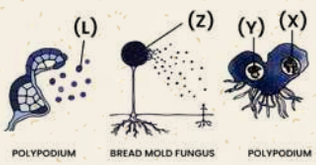
A. The release of cells (Y) is accompanied by release of toxic substances that could cause a decrease in the amount of urine.
B. (Z) and (L) are similar in their chromosomal number and ability to divide.
C. Some of cells (Y) transform into mature gametocytes that are transferred with blood to the female mosquito.
D. Stage (X) is formed in the salivary glands of mosquito by meiosis division of the oocyst.
E. Both X and Y can divide to form each other.

14 **The figure shows two human cells Z and L, that were infected by X and Y which are stages in the lifecycle of Plasmodium Malaria parasite. What is the result of the reproduction of X and Y in cells Z and L respectively?**



A. Merozoites only - Merozoites only
B. Sporozoites only- Merozoites only
C. Merozoites only - Merozoites & toxins
D. Merozoites & toxins - Sporozoites only

15 **Study the given figures showing some stages in the lives of some organisms well then choose the incorrect answer.**



A. L are formed by reduction division of the dominant diploid stage.
B. X and Y are formed by mitotic divisions of a single cell
C. Z and L are similar in terms of number of chromosomes sets.
D. X and Y perform the same type of cell division used to form Z and L.
E. Z has the ability to form a whole new individual.

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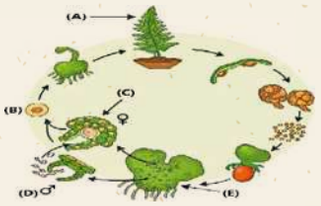
16 **The figure represents the life cycle of Polypodium. Choose the correct statement.**



- **A** (A) results from sexual reproduction and performs asexual reproduction using mitosis division.
- **B** The number of (B) is equal to the number of gametes formed by (D).
- **C** The type of cell division done by the cells that form (E) differs from the division that (E) performs.
- **D** Water is needed by (E) for completion of reproduction.
- **E** E is genetically identical to A.

17 **Which of the following distinguishes seed 1 from 2?**

(1)

(2)

- **A** Being dicotyledonous.
- **B** Dependence on endosperm as a source of embryo nutrition during its development.
- **C** Occurrence of fusion between the ovary wall and ovule integuments.
- **D** Similarity between source of food used during embryo development and that used during germination.
- **E** Difference between source of food used during embryo development and that used during germination.

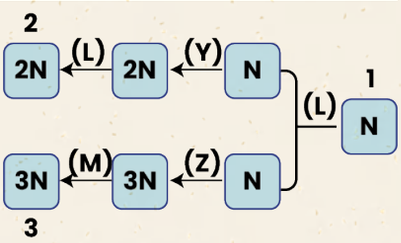
18 **Which of the following distinguishes fruit (2) from fruit (1)?**

Fruit (1)

Fruit (2)

- **A** The components of its flower.
- **B** The origin of its seeds.
- **C** The occurrence of pollination.
- **D** The origin of its fruit.
- **E** The absence of fertilization.

19 **The figure represents an important step of sexual reproduction in flowering plants. Choose the correct statement.**



- **A** L represents mitosis division of male gamete nucleus inside male gonad.
- **B** Y and Z are referred to as triple fusion.
- **C** Land M represent mitosis divisions taking place inside the ovary.
- **D** 1 is resulted from meiosis division of the spore mother cell.
- **E** 2 will feed on 3 during its germination in all dicot seeds.

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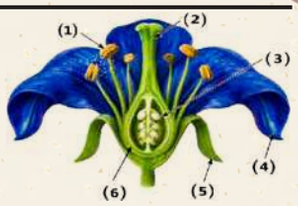
20 Which of the following do not appear in pomegranate or dates?



A 1
B 4
C 5
D 6

21 Choose the correct statement regarding the shown male genital system.

A X has receptors for steroid substances secreted by S.
B If V is blocked, seminal fluid will contain dead sperms, helping in contraception.
C The function of Z is sperm storage and formation.
D Z has receptors for hormones secreted by posterior lobe of pituitary gland.
E If X failed to perform its function, sperm production will stop.

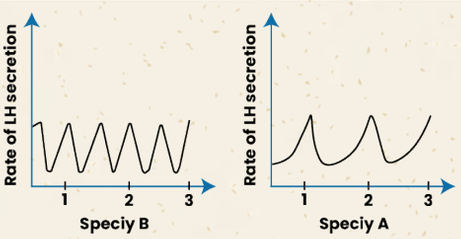
22 The figure represents the structure of sperm, choose the correct statement.

A A & B both have enzymes.
B A & B both play a role in reaching the oocyte.
C B contributes to fetal DNA while A doesn't.
D B can form proteins but A cannot
E A and C

23 Choose the correct statement regarding the given figure showing a T.S. in the human testes.

A Cells (1) are distinguished from cells (5) by their amount of DNA.
B Both cells (1) and (5) contribute to the nutrition of sperms inside the testes.
C Cells (6) differ from the cells (7) in their ability to divide.
D Cell (2) and cell (3) are similar in the number of chromosomal sets.

24 The two graphs represent rate of LH secretion in two females that belong to different species. Which of the following represent A and B respectively?



A Dog - Cat
B Tiger - Mouse
C Lion - Dog
D Lion - Human

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25 **Which of the following structures can be found in an 8-year-old female and a pregnant 39-year-old female in her 5th month respectively?**

A X-Z
B Z-X
C X-X
D Z-Z
E W-X

26 **Choose the correct statement regarding the graph showing stages of the innermost layer of the uterus. Choose the incorrect statement.**

A The hormone responsible for stage (Y) is secreted from a temporary gland that forms another temporary gland later on.
B Stage (Z) can be observed during days 16-21 from the beginning of the cycle.
C Stage (X) takes place due to degeneration of a temporary gland due to occurrence of pregnancy and placenta taking over.
D Stage (Y) coincides with meiosis-I of the female gamete.
E The hormone predominant in stage (Z) could be used to prevent meiosis-I.

27 **Female (X) had both of her fallopian tubes tied, and female (Y) had only one tube tied. What distinguishes changes taking place in female (Y) from those in female (X)?**

A Occurrence of meiosis-I division.
B Occurrence of menstruation normally.
C Ability to get pregnant by IVF.
D Possibility of occurrence of meiosis-II division of female gamete.
E Presence of Graafian follicle in her ovary on day 13 from the beginning of the cycle.

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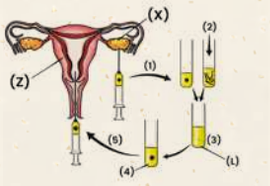
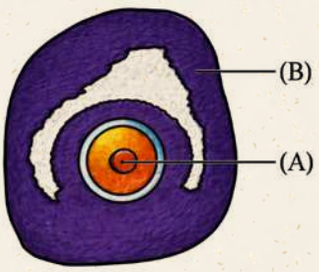
28 **Study the figure that shows an artificial technique. Choose the correct statement.**



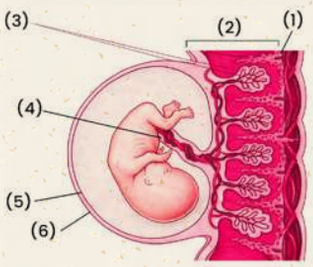
A Both (1) and (2) are fully mature.
B The morula and blastocyst stages are formed in Z.
C Both meiosis-I and meiosis-II of female gamete take place inside the female body but in different organs.
D This technique could be used in cases of blocked fallopian tubes in females and undescended testes in males.
E Step 5 is usually done after 7 days of fusion of female and male nuclei.

29 **The figure represents a structure found in the ovary of an adult female. What is the type of cell divisions that occur to cells (A) and (B) inside the ovary respectively?**



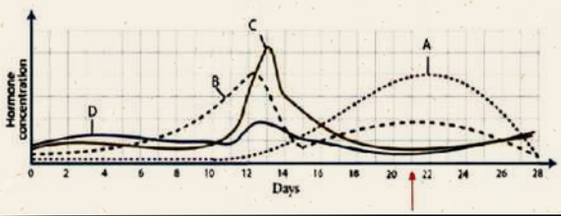
A Meiosis-I/Meiosis-II
B Meiosis-I / Mitosis
C Meiosis-I & II / Mitosis
D Meiosis-II / Meiosis-I

30 **study the given figure well. Then choose the incorrect statement**



A (4) is formed by union of edges of (6).
B Structure (1) and (2) share in the secretion of a protein hormone in the last month of the third stage of pregnancy.
C 2 is temporary structure starts at the beginning of the second stage of pregnancy to secrete steroidal and proteinic hormones.
D All of the above.

31 **Study the given figures and graph relating to menstrual cycle of female. Choose the incorrect statement.**



A Hormone B is responsible for stimulating secretion of hormone C on day 13 from the beginning of the cycle.
B Process (2) occurs due to peak of hormone C.
C When a sperm reaches the oocyte on the day the arrow points to, fertilization doesn't take place due to death of oocyte and process (1) follows.
D Hormone B is responsible for process (3) where meiosis-I takes place.

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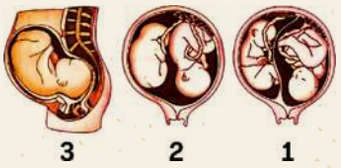
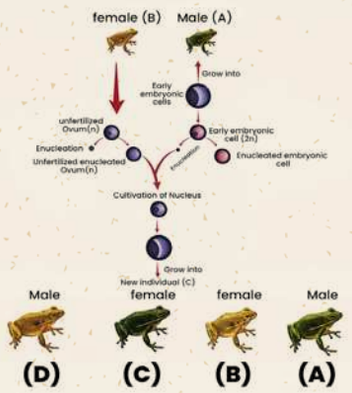
32 **Choose the incorrect statement regarding the given figures.**



A The shown embryos could all be males or all be females.
B In (1), 2 sperms fertilized 2 ova forming 2 morulae.
C In (2), 2 sperms with the same sex chromosomes fertilized one ovum.
D (2) and (3) needed the same number of female and male gametes to be formed.
E The amount of progesterone secreted by (1) is higher than that secreted by (2) or (3).

33 **The figure shows some steps of cloning technique. Which of the following represents Individual C at the end of the experiment?**



A A
B B
C C
D D

Model Answer

1	A	2	C	3	C	4	C	5	B
6	B	7	I.B II.B	8	D	9	C	10	D
11	C	12	E	13	A	14	C	15	D
16	D	17	D	18	D	19	C	20	B
21	A	22	E	23	D	24	C	25	C
26	C	27	D	28	E	29	B	30	A
31	D	32	C	33	A				

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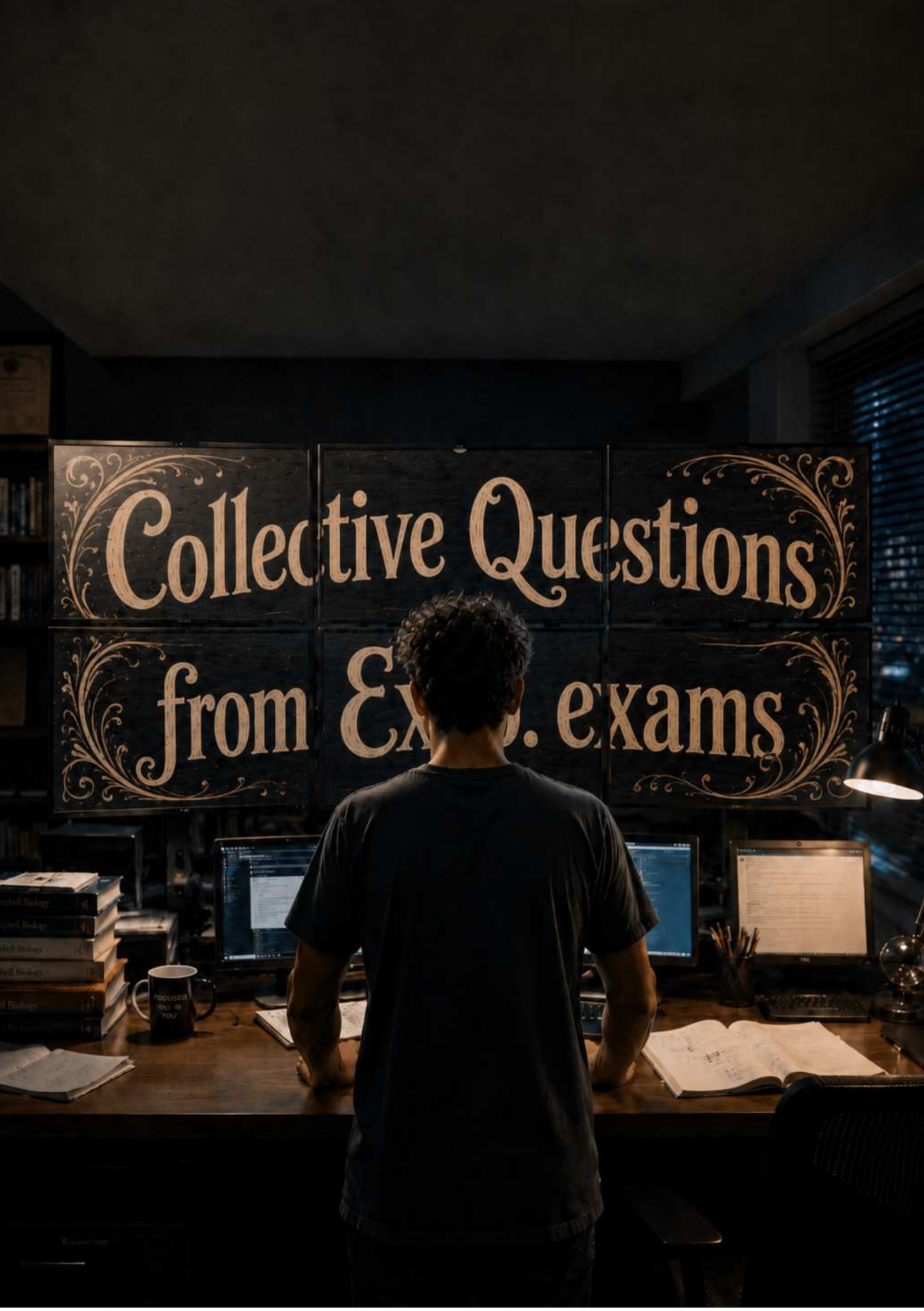

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Questions Ch3

Experimantal 2026

8 What is the similarity between the reproduction of amoeba under unsuitable conditions and reproduction of plasmodium inside red blood cells? **(EXP1)**

A Each of their cells are 2N
B Each of their cells are surrounded by a thick coat
C The number of divisions before liberation of the produced cells
D The type of division used in reproduction

9 The sexual reproduction has unique characteristics, from which : **(EXP1)**

A The Presence of male and female gametes
B Doesn't pass through mitotic division
C Occurs in higher plants and animals only
D Must pass through meiotic division

10 Which of the following accurately represents the correct sequence of steps of sexual reproduction in bean plant? **(EXP1)**

A Pollination - Fertilization - Seed Formation
B Seed Formation - Pollination - Fertilization
C Fertilization - Pollination - Fruit Formation
D Embryo Formation - Fertilization - Pollination

11 What is the function of the fruit in flowering plants? **(EXP1)**

A Protection of seeds and helping their dispersal.
B Attraction of insects for pollination.
C Formation of ovules and fertilization.
D Production of food for the plant seed embryos.

12 What is the main reason for the scrotum being located outside the body cavity? **(EXP1)**

A Increasing the activity of the seminiferous tubules
B Increasing the activity of the epididymis
C Increasing the secretion of interstitial cells
D Facilitating the sperm exiting from the body

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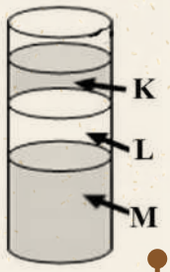
13 To separate sperms containing the X chromosome, the higher in molecular weight, from that containing Y chromosome, centrifugation is used. The denser sperms will be in the lower layers, while the less dense sperms will be in the upper layers. Study the figure and answer:
Which of the following layers can be used to produce only males at a high rate? **(EXP1)**



A) K B) L C) Both K & M D) Both K & L

35 Mature pollen grain contains **(EXP1)**

A) One nucleus.
B) Two nuclei.
C) Three nuclei.
D) Four nuclei

36 Which of the following characterizes all monocot seeds from dicot seeds? **(EXP1)**

A) Ovules wall harden to form testa
B) Has one cotyledon that stores most endosperm
C) The ovary wall swells and forms the fruit
D) The integuments of the ovule are fused with the ovary wall

37 The second meiosis occurs during egg formation only when: **(EXP1)**

A) Fertilization occurs by the sperm.
B) The sperm succeed in penetrating the ovule.
C) The egg is released from the ovary.
D) The ovulation phase of the menstrual cycle begins.

45 **(EXP1)**

a) The pollen grain passes through two mitosis cell divisions, in two different places. Determine these two places and the importance of each of them
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b) illustrate the importance of reduction of number of resulting cells from meiosis division during ovule formation in flowering plant .

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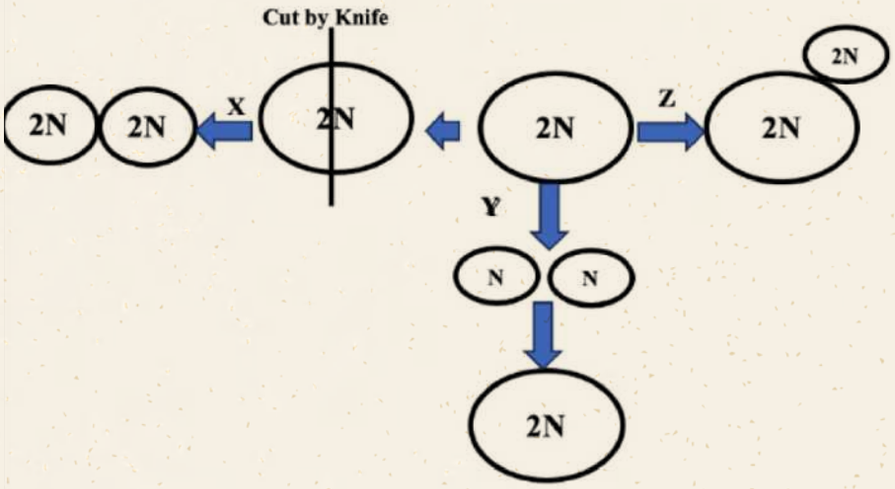
8 The diagram shows the types of reproduction of a living organism, and the vital processes it uses. study it then answer: **(EXP2)**

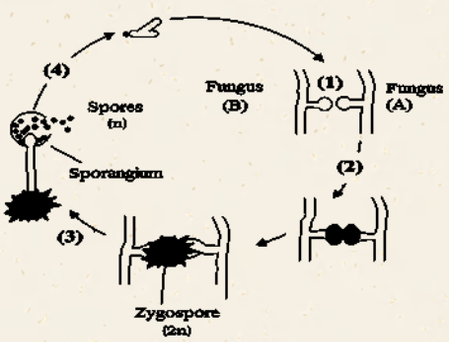


Which of the following represents this living organism and the vital processes it uses?

	Living organism	Vital process		
		X	Y	Z
A	Yeast	Regeneration	Meiosis	Budding
B	Hydra	Regeneration	Meiosis	Budding
C	Carrot plant	Tissue cultures	Fertilization	Artificial parthenogenesis
D	Plasmodium	Fragmentation	Fertilization	Sporogony

9 The following diagram shows the life cycle of bread mould under different environmental conditions, Which of the following represents the numbers indicated by numbers from (1) to (4) respectively? **(EXP2)**

A. Mitosis- asexual reproduction- meiosis - sexual reproduction
B. Sexual reproduction- asexual reproduction- zygote formation- mitosis
C. Asexual reproduction- sexual reproduction- meiosis - meiosis then mitosis
D. Sexual reproduction- zygote formation- meiosis then mitosis - mitosis



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10 When a pollen grain transfers from anther of a flower to stigma of another plant flower of the same species, this process is called: **(EXP2)**

A Internal fertilization
B Cross- pollination
C Self-pollination
D Vegetative propagation

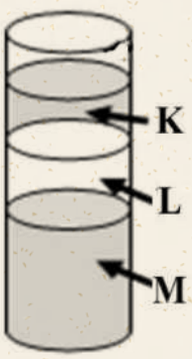
11 What is meant by a fruit in a flowering plant? **(EXP2)**

A One or more free or fused carpels
B Fertilized ovum containing an embryo
C The swollen base of the carpel
D Mature ovary containing seeds

12 What is the direct effect of blockage of the vas deferens? **(EXP2)**

A Sperms will not reach the epididymis
B Increased sperm production
C Sperm will not reach the urethra
D Decreased production of the seminal fluid

13 To separate sperm containing the (X) chromosome (the higher in molecular weight), from that containing chromosome Y, centrifugation is used.
The denser sperms will be in the lower layers, while the less dense sperms will be in the upper layers.
Study the figure and answer:
Which of the following layers can be used to produce only females at a high rate? **(EXP2)**



A L
B M
C Both K & M
D Both L & M

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35 The function of generative nucleus in the pollen grain is: (EXP2)

A Formation of the pollen tube
B Production of the two male nuclei
C Fusion with the egg cell
D Fusion with the two embryo sac nuclei

36 In dicotyledonous seeds, the two cotyledons work to7 (EXP2)

A Store food needed for the embryo during germination.
B Transport food from the ovary wall to the embryo.
C Store food needed for the development of the zygote.
D Store food needed for embryonic development and seed germination.

37 The first meiotic division in human female ovary starts: (EXP2)

A At puberty
B During childhood
C After birth
D At fertilization

45 Based on your study of the life cycle of the fern plant, answer the following:(EXP2)

a What is type of cell division in the sori on the fern plant leaves and in the cells of gametophyte stage? What is the purpose in each case?

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b What is the main factor that affects the completion of asexual and sexual reproduction in the fern life cycle? Explain.

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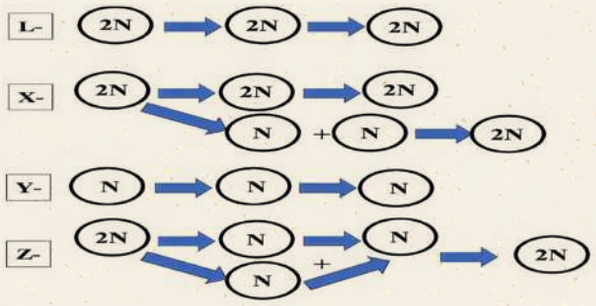
8 In the diagram the methods of reproduction of a living organism, study it then answer :



Which of the following represents this living organism and the vital processes? (EXP3)

	L	X	Y	Z
A	Binary fission	Asexual and sexual reproduction in Aphid	Sporogony	Budding
B	Tissue culture	Asexual and sexual reproduction in Aphid	Sporogony	Asexual and sexual reproduction in Honey bee
C	Sporogony	Asexual and sexual reproduction in Honey bee	Budding	Asexual and sexual reproduction in Aphid
D	Binary fission	Asexual and sexual reproduction in Aphid	Regeneration	Asexual and sexual reproduction in Honey bee

9 Zygote formation during lateral conjugation in spirogyra is different from zygote formation in the gametophyte stage of fern plants in: (EXP3)

A The main method of reproduction used
B Number of chromosomes sets in zygote
C Type of cells participated
D Genetic diversity

10 Which of the following factors does not directly affect the success of the pollination process in the flower ? (EXP3)

A Number of ovules B Insects C Stigma shape D Wind

11 What is the number of fruits formed by a flower its ovary consists of 10 carpels? (EXP3)

A One fruit
B 5 fruits
C 10 fruits
D Number of fruits equal the number of ovules in the carpels

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12 Secretions of accessory glands of male reproductive system are alkaline because the alkaline medium : (EXP3)

A Provides the sperm immunity against microbes
B Increase the levels of testosterone
C Helps sperms to be survived
D Feeds the sperms

13 Magnetic separation of sperms is a technique used to separate normal sperms from abnormal by a very fine way.
In which of the following this technique can get best results? (EXP3)

A Control the sex of embryo
B Extra uterine fertilization
C Production of identical twins
D Production of non - identical twins

35 How much nuclei are present in the pollen tube during its passage through the ovary wall? (EXP3)

A 1
B 2
C 3
D 4

36 The embryo in most of monocots seeds is characterized by? (EXP3)

A Contains a one cotyledon surrounded by endosperm
B Contains one cotyledon containing stored food
C Contains one cotyledon containing stored endosperm
D Grows slowly during germination

37 What is the process that occurs at the formation of ova in female and not occurs at formation of sperms in male (EXP3)

A Occurrence of first prophase
B Production of four nuclei
C First meiosis division
D Stop of second meiosis till fertilization

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45 (EXP3)

Answer the following:

a Meiosis differ in "conjugation" from Meiosis in "gametes formation in term of timing of occurrence and the aim of it. Explain

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b Determine which one of the two types of cell division (meiosis and mitosis) has a role in maintaining the genetic traits, and which one has a role in living organism evolution. With explain your answer

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8 Mammalia is one of the highest living organism which reproduce sexually only but we can use a method of asexual reproduction to production of completely grown new individual with such as (EXP4)

A Cloning
B Artificial parthenogenesis
C Tissue culture
D Test tube babies

9 Which of the following types of reproduction is the most energy consuming? (EXP4)

A Reproduction by gametes in Plasmodium
B Reproduction by fusion of gametes in bees
C Scalariform conjugation in Spirogyra
D Reproduction by gametes in rabbits

10 The pollen tube plays a major role in: (EXP4)

A Delivering the male nuclei to the ovule.
B Stimulating the ovary to develop into fruit
C Delivering the tube nucleus and the generative nucleus to the embryo sac
D Delivering the pollen grain to the ovule to complete the fertilization process

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11 In date fruit, the part that transforms into the pericarp is:(EXP4)

A The ovary wall.
B The ovule integuments.
C The ovary wall and the ovule integuments.
D The outer ovule integument and the ovary wall.

12 The thick muscular wall of the uterus is considered a functional adaptation because it: (EXP4)

A Helps accommodate, protect, and push the fetus during birth.
B Allows the blastocyst to be implanted and supply it with nutrients and oxygen.
C Contributes to the fertilization of eggs.
D Participates in the secretion of sex hormones.

13 In extra-uterine fertilization, the embryo formation starts inside:(EXP4)

A Test tube
B Mother's uterus
C Test tube and the mother's uterus
D Test tube and a nutritive medium

35 The ovule gets the food materials necessary for its formation from (EXP4)

A The funicle
B The ovary wall only
C The nucellus only
D The funicle and the ovary wall

36 The embryo of the seed may keep the endosperm if it: (EXP4)

A Has another source of nutrition
B Stores food in its cotyledons
C Didn't consume all of it during embryonic development
D Needs it during seed germination

37 All of the following cells in the human male body are haploid except: (EXP4)

A Primary spermatocytes
B Spermatids
C Secondary spermatocytes
D Sperms

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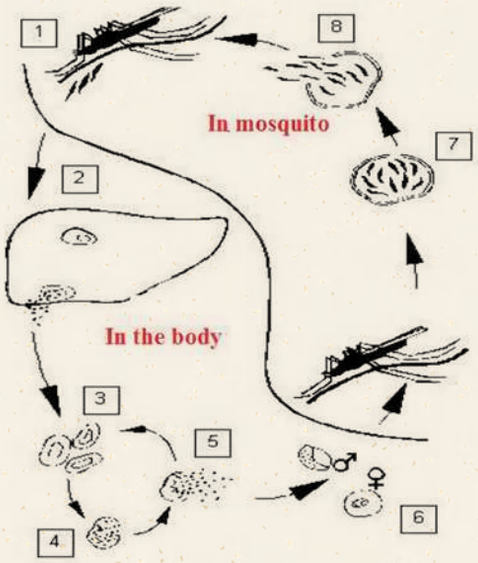
45 The diagram provided illustrates the life cycle of Plasmodium. Study it and then identify the number that corresponds to: (EXP4)



a The stage that leads to genetic diversity in the parasite ----------
b The infective stage to humans ----------
c The infective stage to mosquitoes ----------
d The stage at which malaria symptoms appear ----------

8 What is a main advantage of tissue culture for producing new plants? (EXP5)

A Occurs in natural nutritive medium
B Allows for the rapid production of disease-free plants
C Less expensive than traditional methods
D Requires less technical skill than traditional methods

9 What is the next stage after formation of zygote in the conjugation of spirogyra? (EXP5)

A Can grow to a new filament before conditions become favorable
B Develops to zygospore waiting conditions become favorable
C Divides mitotically waiting conditions become favorable
D Divides meiotically waiting conditions become favorable

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10 In double fertilization, what is probably happen if one of the two male nuclei of pollen tube does not fused with egg cell? (EXP5)

A Embryo is formed but the endosperm not formed
B Endosperm is formed but the embryo not formed
C Each of endosperm and embryo are formed normally
D Neither embryo or endosperm are formed normally

11 Apple is called a false fruit because:? (EXP5)

A Does not contain seeds
B Does not consist of only the ovary
C Contains unfertilized ovules
D Consists of only the ovary of a single flower

12 The fallopian tube is lined with cilia that move toward the uterus. This adaptation helps in: (EXP5)

A Pushing the ovum or the zygote toward the end of fallopian tube.
B Transport sperm toward the ovum.
C Exit of ovum from the ovary towards fallopian tube.
D Push the sperm to inside the ovum

13 Which of the following methods was used to produce a male Ancon sheep in the same way as Dolly the sheep? (EXP5)

A Implanting a nucleus of (Y) sperm from a male Ancon instead of the nucleus of a female breast
B Using nucleus of a cell from the mammary gland from Ancon female
C Implanting a nucleus from the blastocyst of a female Ancon embryo instead of the nucleus of a female egg.
D Using a cell from the muscle of a male Ancon to produce an embryo.

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35 Which of the following is expected to occur in the absence of the tube nucleus in the pollen grain? (EXP5)

A The generative nucleus divides and the pollen tube is formed.
B The pollen grain completes germination and fertilization occurs.
C Fertilization is not completed
D Double fertilization occurs

36 In seeds such as wheat and corn, nutrients are stored in: (EXP5)

A Two cotyledons surrounding the embryo
B The embryo sac
C The embryo
D The seed coat

37 All of the following apply to Sertoli cells except : (EXP5)

A Production of male hormones
B Have immunity function
C Nutrition of sperm
D Found in the wall of the seminiferous tubules

45 (EXP5)

a Explain the reason for the presence of small amount of cytoplasm and it not depends on it in its nutrition?

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b Explain the importance of the presence of large amount of cytoplasm in the ovum of human before fertilization and after it?

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Model Answer

Question	Answer	Question	Answer
8 (EXP 1)	D	13 (EXP 3)	B
9 (EXP 1)	D	35 (EXP 3)	B
10 (EXP 1)	A	36 (EXP 3)	A
11 (EXP 1)	A	37 (EXP 3)	D
12 (EXP 1)	A	8 (EXP 4)	A
13 (EXP 1)	A	9 (EXP 4)	D
35 (EXP 1)	B	10 (EXP 4)	A
36 (EXP 1)	B	11 (EXP 4)	A
37 (EXP 1)	B	12 (EXP 4)	A
8 (EXP 2)	B	13 (EXP 4)	D
9 (EXP 2)	D	35 (EXP 4)	D
10 (EXP 2)	B	36 (EXP 4)	C
11 (EXP 2)	D	37 (EXP 4)	A
12 (EXP 2)	C	8 (EXP 5)	B
13 (EXP 2)	B	9 (EXP 5)	B
35 (EXP 2)	B	10 (EXP 5)	B
36 (EXP 2)	A	11 (EXP 5)	B
37 (EXP 2)	A	12 (EXP 5)	A
8 (EXP 3)	B	13 (EXP 5)	D
9 (EXP 3)	C	35 (EXP 5)	C
10 (EXP 3)	A	36 (EXP 5)	B
11 (EXP 3)	C	37 (EXP 5)	A
12 (EXP 3)	C		

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ESSAY ANSWERS :

45 (a) (EXP 1)

- Mitosis in anthers where the microspores divides into two nuclei which are the generative nucleus and the tube nucleus
- Mitosis at germination on the stigma of flower and formation of two male nuclei

45 (b) (EXP 1)

- To produce one single cell (embryo sac)
- To store necessary food needed for development of ovule to be ready for fertilization

45 (a) (EXP 2)

Cells	Type of division	Purpose of division
Sori in fern plant leaves	Meiosis division	To reduce number of chromosomes to produce haploid sp ores for asexual reproduction by sporogony
Cells of ametophyte	Mitosis division	To produce male gamete (ciliated sperms) and female gametes (egg cell) for sexual reproduction

45 (b) (EXP 2)

The main factor: Presence of water in soil

- For spore germination (asexual) where spore forms the gametophyte
- For fertilization (Sexual), water is a suitable medium for transferring ciliated sperms to the egg cell to fertilize it

45 (a) (EXP 3)

	Meiosis in conjugation	Meiosis in gametes formation
Timing of occurrence	After conjugation = fusion process (formation of zygospore) when conditions improve	Before Fertilization
Aim	To reduce chromosome number by half to restore the original chromosomal number of the organism (N)	To reduce chromosome number by half and then after fertilization→ fusion of nuclei occurs → the organism returns to its original number

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45 (b) (EXP 3)

	Mitosis	Meiosis
Role	Maintaining genetic stability	Evolution of organism
Explanation	Transfer of identical traits to offspring	Results in genetic variation

45 (EXP 4)

A) Meiotic division (7)
B) Sporozoites (1)
C) Gametocytes (6)
D) Rupture of RBCs (5)

45 (a) (EXP 5)

- To be light in movement and fast which increases its efficiency in fertilization
- It gets its nutrition from secretions of seminal vesicles (fructose) and Sertoli cells

45 (b) (EXP 5)

- Before Fertilization, to be a source of nutrition for ovum during it's formation in ovary
- After Fertilization, to be a source of nutrition for zygote during it's formation in ovary

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